PLANTERS' BULLETIN

OF THE RUBBER RESEARCH INSTITUTE OF MALAYA

PLANTERS' BULLETIN FIFTY-ONE

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PLANTERS' BULLETIN

OF THE RUBBER RESEARCH INSTITUTE OF MALAYA

Kuala Lumpur November 1960 Number 51

Editorial: An Outstanding Success

In his address at the Closing Session of the Natural Rubber Research Conference on October 1st, Sir Geoffrey Clay, Controller of Rubber Research, described the Conference as 'outstandingly successful . . . judged either by the number and quality of the papers submitted or by the attendance'. It should be added that one of the main aims of the Conference — to facilitate the international flow of ideas — was successfully achieved, both in formal meetings and in private discussions. That such an exchange of ideas has its practical value was well illustrated in Professor Blackman's review of work on yield stimulation by plant growth substances: he showed that research on these substances in many countries has led to an increase in Malayan rubber production worth tens of millions of dollars.

Among other important botanical subjects discussed were intensive tapping, the breeding and performance of clones, vegetative propagation and the use of cover plants. Considerable attention was paid to nutritional problems, an outstanding topic being the use of leaf and latex analyses to determine nutrient requirements. Several speakers stressed the need to pay more attention to elements other than 'N P K' when considering manurial programmes. In the section on 'Pests and Diseases' attention was concentrated on the study and control of root disease.

As Sir Geoffrey Clay pointed out, the main link between the 'agronomic' and 'chemical-technological' sessions of the Conference was supplied by the papers on the genesis and nature of latex itself. Ultimately, the knowledge derived from this research, which was reviewed with great clarity by Professor Bonner, may have an important influence on measures to improve the yield, preservation and processing of latex.

Discussions on the processing of rubber included the bacterial contamination of latex, latex constituents, the reactivity of the rubber hydrocarbon and its control, the improvement of sheet, SP rubbers, and applications of rubber in road-making and the textile industry. Finally, Professor Gee reviewed the roles of natural and synthetic rubber, demonstrating their separate and sometimes complementary functions in the manufacture of a wide range of products. His review was both instructive and encouraging for our industry, being entirely devoid of the soporific quality which we have come to associate with statements on the 'virtues of natural'.

This brief review will give readers some idea of the scope, and of the success, of the Conference. Our next issue will be almost entirely devoted to summaries of the papers presented, with emphasis on points of practical interest to the rubber producing industry.

Recent Developments in the Diagnosis of Fertiliser Requirements

WHEN ASKED FOR FERTILISER SCHEDULES for mature rubber, the Soils Division of the R.R.I.M. has so far given generalised recommendations based on the results of many field experiments carried out over the past thirty years. When nutrient deficiencies are encountered, a visual inspection of the trees, in particular the foliage, is made, and in very many cases it has been possible to diagnose the deficiency by inspection alone. When multiple deficiencies are suspected, or when there is reason for doubt, the leaves are analysed and a comparison is made between the results of the analysis of unhealthy and healthy leaves, both collected from the same area. It has been principally through this approach that magnesium, potassium and manganese deficiencies have been diagnosed and treated over the past few years on many estates.

'PHYSIOLOGICAL DIAGNOSIS' IN VIETNAM

Whilst it is relatively easy to recognise leaves which are suffering from a gross deficiency, it is by no means easy to recognise those showing a slight deficiency, either by visual inspection, or by inspection of the analytical data from the leaves. To overcome this problem a new technique for determining the fertiliser requirements of rubber, by a study of the analytical composition of leaves and latex, has been developed over the past few years in Vietnam by M. Beaufils of the Institut des Recherches sur le Caoutchouc au Vietnam. This new technique is called 'Physiological Diagnosis'. He claims that it is possible to predict with some precision, on the basis of the results of the analysis of leaves and latex, what fertilisers should be added to the soil in order to increase production. The method depends on the use of already-established values for the nutrient composition of healthy trees.

Officers from the Rubber Research Institute who visited Vietnam last year came back convinced that the technique was of importance and of practical value in Vietnam, where it is now being applied on a large scale; 90,658 acres of rubber were treated in 1959. The Officers visited two estates where laboratories had been built, and permanent laboratory staffs recruited to sample and analyse the leaves and latex. It is fundamental to the method that each field, planted with a single clone of uniform age, is treated as a unit, and that the information gained from the trees in one field is used in that field alone. In practice this means that all fields on an estate are considered individually each year, and that routine fertiliser schedules cannot be worked out. For mature trees the sampling of leaves and latex would be carried out every year, ideally in the period September to December. This would allow time for the diagnosis to be made and for fertilisers to be ordered in time for application during the wintering period in the following year.

Figure 1. Leaf Sampling: Leaves, borne on small branches which themselves arise from main branches low down on the tree, can often be collected from ground level. The illustration shows the sampling of such leaves, which are normally in the shade of the canopy.

EXPERIMENTS IN MALAYA

The work of the Rubber Research Institute on the basic principles involved in the problem of determining fertiliser requirements by means of leaf and latex analysis was started in 1957, but last year's visit to Vietnam showed the need to step up the programme of research to test this new technique in Malaya on as large a number of estates as possible. The fact that the technique has had success in Vietnam indicates that the mineral nutrition of the tree is a major limiting factor in production, but it remains to be seen whether this is also true of Malaya.

Sixteen experiments have already been started to test the validity and usefulness of this new method of diagnosis in Malaya. In these experiments a control section of rubber is used which receives no fertiliser, another section receives fertiliser in line with the present schedules recommended by the R.R.I.M., and a third is given fertiliser in accordance with the results of the leaf and latex analysis. These experiments are being carried out in areas where a survey sampling is being made of the composition of leaves and latex from four clones of

Figure 2. Injection: The first operation involved in the injection of nutrients into the tree is the drilling of the holes. A portable drill, powered by a generator (right hand side of tree), is used for this work. After the holes have been drilled, a plastic tube is inserted into the orifice, and the tablets of fertiliser are injected through the tube.

post-war plantings. The experiments will provide further information not only on the fertiliser requirements of rubber but also on the relationship between the mineral composition of the tree and latex yield — information which will be vitally important if the technique developed in Vietnam is not directly applicable in Malaya.

Whilst the principle of the method may prove to be valid in Malaya, the values for the optimal nutrient composition of the healthy tree as calculated in Vietnam will not necessarily be applicable here. These values may need to be recalculated for Malaya from the data which are now being collected from survey samples.

When the nutrient requirements have been assessed, the next step is to apply the correct fertiliser to meet this requirement. The sixteen experiments referred to above and others in progress will enable us to determine the extent to which the fertilisers commonly used on mature rubber improve the nutrient composition of the tree.

In an extension of this work, a further method of supplying nutrients to the tree is at present being investigated in Malaya. This involves the injection of nutrients into the trunk of the tree. By this method it is possible to provide the tree with the nutrients that it requires without having to take into consideration any interaction between the applied fertiliser and the soil. Whilst for example only a small proportion of phosphate applied to the soil is readily available to the tree, an injection of phosphate into the wood would be readily available for utilisation by the tree. The injection consists of drilling a few holes into the trunk or the collar of the tree and inserting a plastic tube into the orifice to protect the cambium. Tablets or pellets of fertiliser are injected through the plastic tube, and repeated injections can be made in the same hole. Tree injection offers a quick method of altering the nutrient status of the latex drainage area and it is hoped that some nutritional problems associated with latex precoagulation will be solved by the application of this method.

It is expected that the experiments described here will yield significant results within a few years. It should then be possible to predict whether the new techniques, involving what might be called 'precision manuring', can be successfully applied under Malayan conditions.

Stimulation of Yield: a Comparison of Proprietary Yield Stimulants

SEVERAL EXPERIMENTS have been carried out at the R.R.I. Experiment Station in which a large range of experimental yield-stimulating formulations has been used and in which the conventional yield stimulants have been applied as control treatments.

Nearly all these experiments were conducted on trees which were tapped on renewed bark and they showed that there was little to choose between Flomore and Star brand (containing 2,4,5-T) and Stimulex (containing 2,4-D), when application was made to a $2\frac{1}{2}$ in. strip of scraped bark below a half-spiral tapping cut. The tapping system employed in these experiments was S/2.d/2.100%. In later experiments, in which Ready Rub (containing 2,4,5-T) was also included, this stimulant was in several cases less effective than the others if applied to renewed bark below the cut, but good results were obtained on ladder tapped trees in a few observation plots.

We are now able to give the results of a large scale experiment laid down on an estate in Selangor, with the object of obtaining information on costs of application and effect on yield of the four proprietary yield stimulants now being sold in Malaya; the same stimulants were discussed in *Planters' Bulletin 45* in the article 'Stimulation of Yield of Rubber Trees as a Routine Estate Practice'.

In this experiment we have compared six different stimulation procedures on budded trees of mixed clones (predominantly clone AVROS 49) budded in 1928 and now tapped on high panels which were first opened at 120 in. When the experiment started, the cut was at 110 in. above the union.

The following treatments were included:

1. Flomore applied to three inches of scraped bark below the cut.
2. Stimulex applied to three inches of scraped bark below the cut.
3. Ready Rub applied to three inches of unscraped bark below the cut.
4. Experimental mixture applied to three inches of scraped bark below the cut.
5. Stimulex applied at two-monthly intervals above the cut.
6. Flomore applied to $\frac{1}{3}$ of each task* at two-monthly intervals to 3 inches of scraped bark below the cut.
7. Control trees tapped on high cuts without stimulant.

Each treatment was applied to 6 tapping tasks; a total of 42 tapping tasks was thus used in this experiment, of which 21 were tapped on one day and the other 21 on the next tapping day. The following observations were made.

EFFECT ON YIELD

The monthly yield trend of the various treatments is illustrated in the accompanying graph (page 118), which shows the mean monthly yield, in pounds, of dry rubber per task per tapping.

* A devise used on some estates to avoid the fluctuations in yield usually associated with stimulation.

It is seen that when the mixtures were applied below the tapping cut to a three-inch strip of bark (Treatments 1,2,3 and 4), there is a high peak yield during the first month after application, followed by a gradual decline. The yield, however, remained above that of the control tasks (ladder tapping without stimulation) throughout the six-month period of observation. Alternate monthly application of 'Stimulex' above the tapping cut gave the most constant improved yield level and the curve suggests that an even smoother yield trend would have been obtained if applications had been made at monthly intervals.

The scattered Flomore application, in which one third of each task was treated at two-monthly intervals, cannot be fairly judged from the results of this experiment; two-thirds of the task were not stimulated at the beginning of the experiment, with the result that the yield increase during the first two months was comparatively small. When, after two months, another one-third of the trees was stimulated, a further improvement in yield was noticed and the highest yield was recorded when the third batch of trees was stimulated, four months after the start of the experiment. This method of stimulation, as expected, produced a smooth trend of increased yield and provides a satisfactory solution to the problem of avoiding large fluctuations in yield level and tappers' earnings.

The yield data are also shown in Table 1 which gives the mean monthly yield in pounds of dry rubber per task per tapping for: (a) the first two months, during which the peak yields of Treatments 1,2,3 and 4 are observed; (b) the second four months, when it becomes

TABLE 1. MEAN MONTHLY YIELD IN POUNDS PER TASK PER TAPPING

Treatment	*Below or above cut*	*First two months*	*Last four months*	*Full six months*
1. Flomore	below	28.1	20.9	23.3
2. Stimulex	below	30.2	20.9	24.0
3. Ready Rub	below	27.1	20.3	22.6
4. Exp. mixture	below	27.3	20.6	22.8
5. Stimulex	above	23.1	23.6	24.0
6. One-third Flomore	below	20.5	21.3	21.0
7. Control	—	18.0	17.1	17.4

apparent that the increase in yield from Treatments 5 and 6 is sustained; (c) the full six months' experimental period which gives a valid comparison between all treatments except Treatment 6 (scattered Flomore application).

During the first two months' treatment, 1,2,3 and 4 are clearly superior to Stimulex application above the cut, but the picture is reversed in the following four months. Analyses of results covering the whole six months' period show no significant differences between treatments; in other words, the differences are so small that they may be due to chance.

COST OF APPLICATION

Table 2 gives details on costs of labour and material in our experiment, excluding scrapers and brushes. Each labourer was paid $3.00 per day.

TABLE 2. COST OF YIELD STIMULATION

Treatment	*No. of trees treated*	*No. of man-days required for*		*Quantity of stimulant used, lb*	*Cost per acre in $*		
		scraping	*painting*		*labour*	*material*	*total*
Flomore	1531	29*	8	32	5.88	1.01	6.89
Stimulex (below cut)	1496	28*	8	31	5.73	1.38	7.11
Ready Rub	1506	nil	10	48	1.59	2.92	4.51
Stimulex (above cut), alternate monthly	1392	nil	6 × 3 = 18	10 × 3 = 30	2.82	1.32	4.14

* The slight difference between these two figures is due to the fact that the first stimulant to be used, in the short period when the workers were still acquiring proficiency in the method of application, was Flomore.

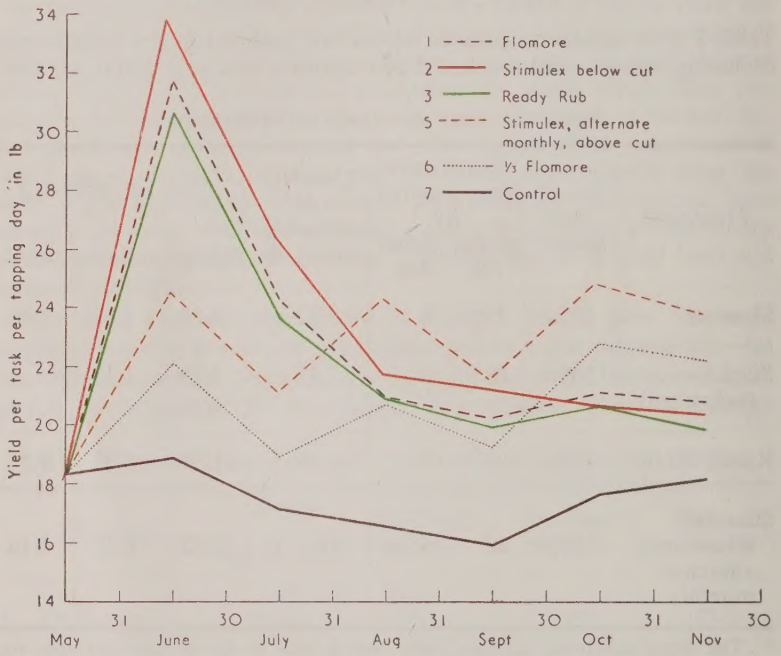
Labour requirements for scraping and application of Stimulex below the cut and Flomore are similar. Ready Rub required more labour for painting, as rough unscraped bark is more difficult to cover with a stimulant than a smooth strip of scraped bark; 48 lb of Ready Rub were used as compared with 32 lb of Flomore and 31 lb of Stimulex. The quantity of 2,4,5-T applied per tree is thus higher for trees treated with Ready Rub; but this is not reflected in the yield response.

Stimulex applied above the tapping cut at two-monthly intervals (to the strip of bark left after the previous two months of tapping) required,

by reason of its high frequency of application, more labour for painting, but the total cost of application remains low as no scraping needs to be done.

BARK REACTION

An inspection of the condition of the treated bark was made two months after application of the stimulant. Of the trees treated with Flomore, 9.4% showed bulging of the lower part of the scraped strip of bark and some vertical cracks were observed. None of the trees went dry and the trees continued to yield normally when the treated bark had been tapped away (see graph).



Yield per task per tapping day after stimulation. Treatment No. 4 (experimental mixture) is omitted for the sake of clarity.

No bulging or cracking of the bark was observed on trees treated with Stimulex below the cut, but the trees treated above the cut showed some swelling. A further inspection made seven months after the conclusion of the experiment showed damage of the renewed bark treated with Stimulex, above the cut. This was unexpected, since we have conducted other experiments with this stimulant in which a smooth renewed bark of highly increased thickness was obtained. The stimulant was applied to the trees under close supervision of R.R.I. field assistants and estate staff members. We must conclude from this experiment that

it is unsafe to treat bark above the cut with a yield stimulant if the bark has to be tapped again in the future.

Of the trees treated with Ready Rub, 35% showed swelling and vertical cracks. The bark which had not been scraped had an oil-soaked appearance, but when it had been tapped away the trees continued to yield normally. It is suggested that on trees tapped alternate daily not more than two inches of bark should be painted with Ready Rub.

CONCLUSIONS

All three commercially available yield stimulants have induced a satisfactory yield increase of approximately 30%; there is no significant difference between the total increases obtained by using the various stimulants. Star brand, which is identical to Flomore, should be included in this list (see *Planters' Bulletin 45*, November 1959, page 127). Stimulex (2,4-D) proved again to be less injurious to bark tissue than stimulants containing 2,4,5-T, but, under the conditions of this experiment, induced damage to renewing bark when application was made above the cut.

Three alternate monthly applications of Stimulex above the tapping cut have given a yield increase similar to one application of stimulant to three inches of scraped bark (or, in the case of Ready Rub, to unscraped bark) below the tapping cut.

This is not in agreement with observations made in other experiments, where a better yield response was recorded when the stimulant was applied below the cut.

The experiment shows that with an investment of between $4.14 — $7.11 per acre, an extra crop has been obtained of approximately 145 lb of dry rubber per acre over the experimental period of six months. This is certainly not an unusually high response. The relatively low yield increase obtained may be attributed to the rather poor quality of the trees in more than half of the experimental area, which is bounded by swamps and has water-logged conditions in eleven out of the forty-two tasks.

Two Phaseolus Species of Interest

1. *Phaseolus calcaratus* Roxb. (Rice bean; *kachang sepalit*)

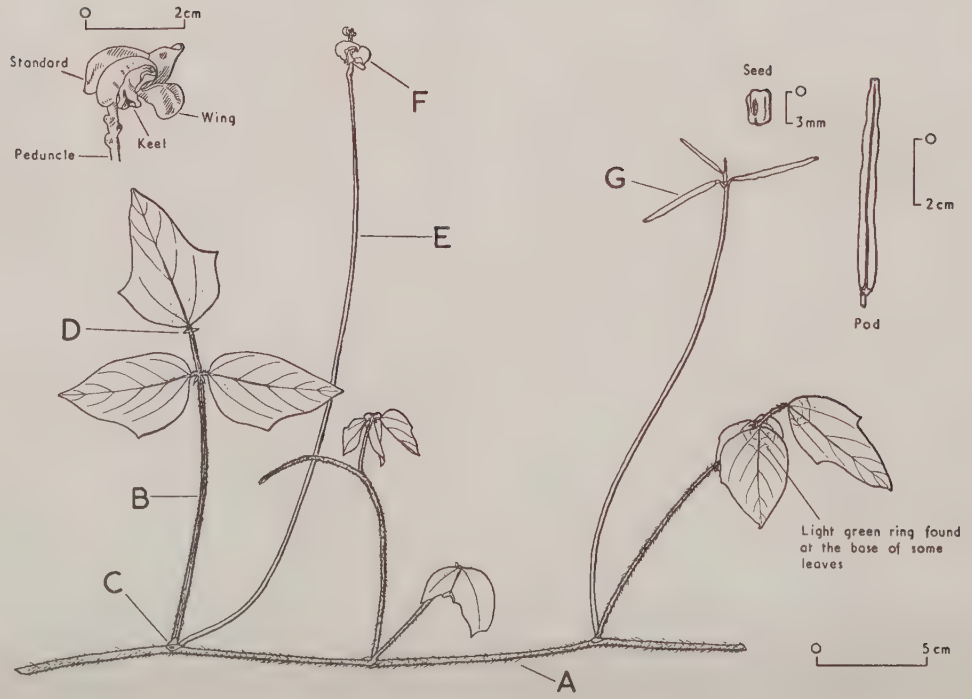
A twining legume, native of South East Asia, this species is often found spreading fast in the new plantings and replantings, having either regenerated naturally or grown as a rogue among plants from imported cover crop seeds.

In view of the great number of specimens being received from estates, the following description is given as an aid to identification.

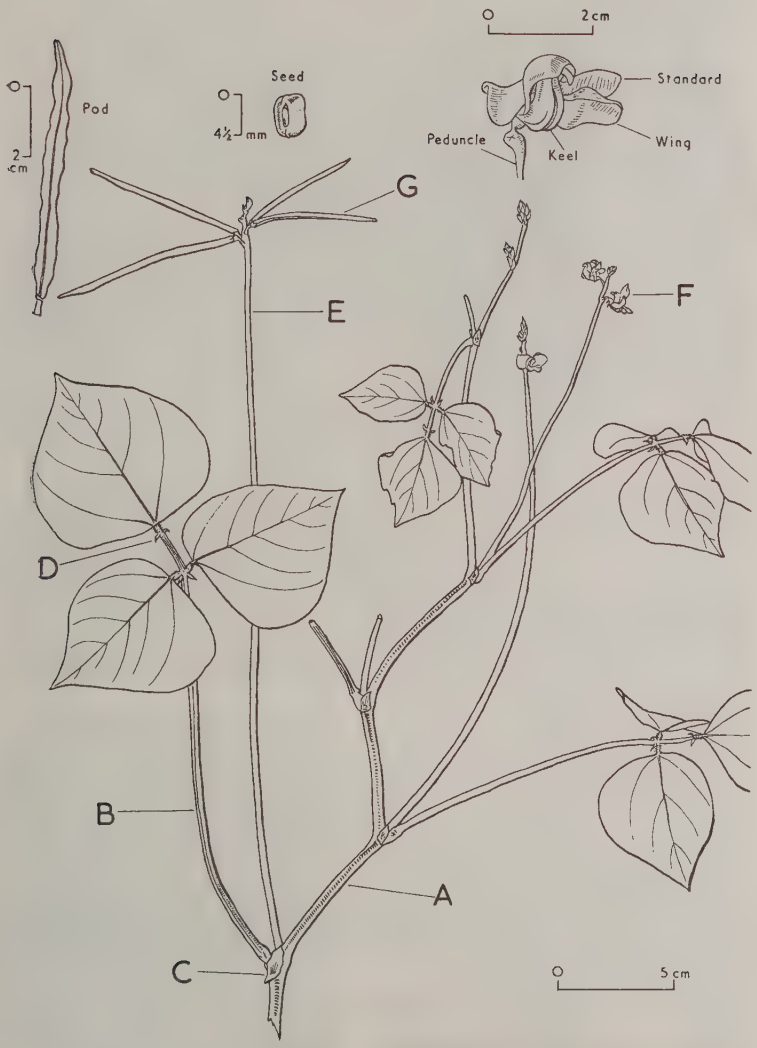
The creeping stem is covered with brown hairs which are stiff and point backwards. Leaves trifoliate. The petiole is grooved, purple and

Phaseolus calcaratus

A. *Creeping stem*
B. *Petiole*
C. *Stipule*
D. *Stipel*
E. *Peduncle*
F. *Flower*
G. *Pod*



Phaseolus angularis



A. *Ascending stem.* B. *Petiole.* C. *Stipule.* D. *Stipel.* E. *Peduncle.* F. *Flower* G. *Pod.*

hairy. Leaflets variable in size and shape according to age and varietal differences, the wedge-shaped form being most common (see diagram). A yellowish ring may be found at the base of the leaflet. Flowers are bright yellow, borne in pairs on the two sides of the inflorescence stalk which is 8 — 10 inches long. The keel is twisted as is characteristic of the genus. The pods are hairy to a varying degree, and mostly curved with a prominent beak; each contains 6—10 seeds which are oblong and rounded at the ends. Constrictions between the seeds are not prominent.

Two strains of *P. calcaratus* are commonly observed in the plantings. The variety *gracilis* is a slender short-lived climber with very hairy pods. The variety *glabra* is a more vigorous climber with thick hairless leaves. It is more persistent than the variety *gracilis*.

There are instances where *P. calcaratus* has overgrown the vigorous *Pueraria phaseoloides* and suppressed *Mikania scandens* and grasses. The shade tolerance has been better than that of *Pueraria* in some instances. Encouragement and observation of this species may yield a good cover plant.

2. *Phaseolus angularis* Wight (Adzuki bean)

An erect, bushy plant growing vigorously to a height of 1 — $2\frac{1}{2}$ ft. It is short-lived and seeds profusely.

The stem is angular, grooved and often coloured purple. Leaves are trifoliate. Leaflets are dark green, ovate to rhomboid in shape, with sparse minute hairs; the terminal leaflet is symmetrical but the laterals are asymmetrical. Flowers are borne in two to three pairs, the standard and wings are orange in colour and the twisted keel is yellowish green. The pod is cylindrical, hairless, $2\frac{1}{2}$ — $3\frac{1}{2}$ in. long, with a short blunt beak; each contains 6 — 8 seeds. There are constrictions between the seeds when the pods are mature.

The general growth is dense, but *P. angularis* degenerates after seeding, although there is often regeneration from self-sown seed. *P. angularis* is therefore a temporary cover, seed of which can be raised on the estate for covering bare patches. It has been used as a border along rows to retard the spread of creeping legumes into the weeded strip, and also to give rapid binding of the bunds used to prevent erosion on slopes.

These and other species of *Phaseolus* are being tested in a small scale trial and we would welcome small samples of seed from planters who find interesting specimens.

Trapping Cockchafer Beetles

CHEMICAL TREATMENT against cockchafer grubs, discussed in page 48 of *Planters' Bulletin 41*, is confined on economic grounds to protecting the main roots of young trees; it is not feasible to destroy the grubs

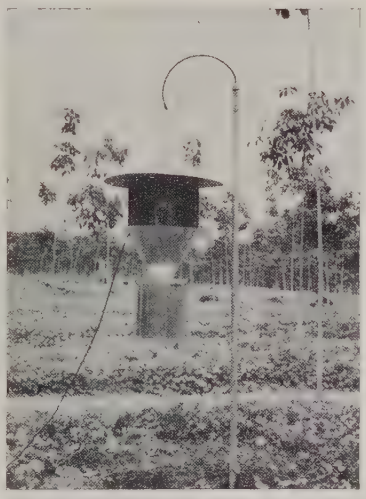


Figure 1. Trap **A** *with a 125-Watt ultraviolet bulb as the light source.*

under the cover in the inter-rows. Many adult beetles emerge, therefore, to start a new attack the following year. To be able to catch them during the flighting season early in the year, thereby reducing the numbers laying eggs in the plantation, promises great advantages. With the object of finding a method that would work, light traps of various design were built and operated daily from 20 January to May of this year Trapping was done on two estates in Negri Sembilan where severe attacks by grubs of *Holotrichia bidentata* had been experienced last year.

At first, the traps were operated in the early morning and late evening (4—6 a.m. and 7—10 p.m.) to cover the dawn and dusk periods of flighting. Later, however, the morning operation was discontinued as the catches were disappointingly small.

There were only minor differences in the design of the traps, principally to accommodate either a bulb or tube lamp as the light source. Four light sources were compared: **A** a 125-Watt ultraviolet bulb; **B** a 15-Watt ultraviolet fluorescent tube; **C** a 125-Watt mercury vapour bulb; **D** a 150-Watt incandescent bulb. The power for all the traps was supplied from electric mains.

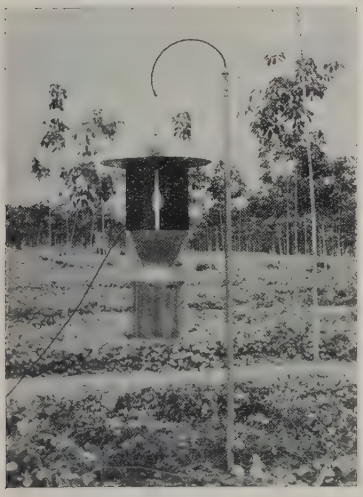


Figure 2. Trap **B** *with a 15-Watt ultraviolet fluorescent tube. The box at the top contains the choke.*

On one estate the supply was d.c., necessitating the use of a rotary convertor, from which lamps **A** and **B** were supplied. Lamp **D** was connected direct to the mains. Here the traps could not be brought nearer than half a mile from the previously attacked field. Altogether, during the period 11 February to 13 April, more than 9000 *H. bidentata* beetles were caught.

On the second estate, types **A**, **B** and **C** were used. A conveniently placed a.c. mains supply made it possible to operate traps inside the previously attacked area. The catch in the same period was more than 69,000 *H. bidentata* beetles.

COMPARISON OF LIGHT SOURCES

The beetles were much more attracted to ultraviolet than to white light, the order of attractiveness of the four lamps being **A**,**B**,**C**,**D**. When all three lamps were in use on the first site, from 19 February to 25 March, the catch was divided 50%, 44% and 6% between **A**, **B** and **D**. On the second site, over the period 11 February to 13 April, the distribution was 44%, 31% and 21% between **A**, **B** and **C**. For a 19-day period an additional **A**-type trap, operated without the rain shield, caught $1\frac{1}{2}$ times as many beetles as trap **A** (*Figure 1*). It was thus the most successful of the traps used. However, trap **B** with the 15-Watt light source (*Figure 2*), appears from these results to be the most promising, owing to its lower cost of operation. Moreover, with its low rate of power consumption it can be worked from an ordinary 12-volt car battery, using an electronic convertor to produce alternating current; hence it can be operated anywhere.

GENERAL OBSERVATIONS

On the second site, where the catch was the greater, certain additional observations were made. The peak period of flighting was the latter half of March, when three-quarters of the total catch was taken, coinciding with a period of wet weather after a prolonged drought. Beetle activity was greatest for about an hour after dusk. For the three successive hours, 7 p.m.—10 p.m., the catches were roughly in the proportions 7: 2: 1. Almost all the beetles collected during the early days were males, but the proportion of females gradually increased until, towards the end of the experiment, almost all were females. Well developed eggs were found in the females from 24 March onwards, the proportion containing them rising to about 80% by the time trapping was discontinued. For the last month, only one trap continued in operation, until the catch had dropped to insignificant proportions.

The early results reported here show that the light traps have promise as a control measure against cockchafers. Our intention is to operate more of them during the first half of 1961, using the 15-Watt battery-driven units. Our aim will be to discover the effective range of these traps, and so determine the numbers and spacing that would be needed to prevent re-infestation of an affected area effectively.

Managers of estates which suffer a cockchafer grub attack during the later months of this year are invited to inform us, should they be interested in having traps operated on an experimental scale.

Heat Scorch by Pebbles

A TYPE OF DAMAGE to young seedlings which was first drawn to our attention on an estate in North Malaya in May 1959 is shown in the accompanying photograph. Study of specimens showing progressive development of the condition indicated that proliferation of cork cells at the collar was followed by fissuring, death of underlying tissues, and resultant die-back of the whole seedling. The condition usually started from one side of the stem and reached a relatively advanced stage before discolouration and death of foliage were apparent. The soil in the area was an eroded Malacca series soil with concentrations of pebble laterite in the surface layers. In the planting holes, normal settling of loosened soil generally resulted in a layer of gravel occupying the ground surface around the seedlings. The 1959 dry season was particularly early, having started in December 1958, and the normal high intensity of drought and heat of the north Malayan climates was experienced. It was apparent that growth of the seedlings had been slowed down by unfavourable weather before normal foliage development could provide for individual shade. The dark-coloured pebbles in contact with the stem bases had thus absorbed considerable heat from intense afternoon sunshine with consequent scorch of the stem bases. As the dry season was nearly over when the trouble was discovered in May 1959, no remedial action was taken. When it recurred in December on seedlings planted the previous October, mulching with lalang straw was adopted; the casualties from the scorch showed a rapid decline during the following four weeks.

A specimen of seedling rubber suffering from scorch. Left, the root and base of the stem showing fissures in the bark following proliferation of cork cells at the collar. Right, the whole plant, showing withering of the leaves.

Further casual observations on other properties suggest that this trouble may pass unnoticed when a small proportion of plants has been affected, scorch cases being dismissed as runts. The number of plants killed may be insignificant but the retarding effects on growth through desiccation of soil and plant tissues should be taken into account.

Mulching may therefore be a valuable routine practice in districts subject to intense, hot droughts such as parts of Kedah and Kelantan, and we would recommend laying the material down in the December or January following planting.

Book Review

A.T. EDGAR. **Manual of Rubber Planting (Malaya)** 1958. (First published 1937, reprinted 1947), pp. 705. Kuala Lumpur; Incorporated Society of Planters. $30 (Malayan).

Since it was first published in 1937, 'Edgar's Planting Manual' has been the most compact and the most valued technical manual available to the Malayan rubber planter. The new revised and enlarged edition, dated 1958, which is now on sale, maintains the high standard set in the past. Inevitably, owing to the time taken in the compilation and preparation of the manual, there are points where the latest information has not been included and these are indicated in the review below. This review has been prepared by the four main Research Divisions of the Institute, each Division dealing with the parts of the book covered by its own field of research. 'Edgar's Planting Manual' is confidently recommended to the rubber planting industry, both in Malaya and overseas.

Soils. Mr Edgar discusses all aspects of the soils of Malaya, their derivation, composition and moisture status, and also discusses in several sections the manner in which soil fertility can change as a consequence of rubber cultivation. The use of cover plants and fertilisers as cultivation aids for rubber is described at length. To do this, a large number of sources have been drawn on, with the aim of giving the reader a full picture of past and current practices, as for example in the quotation of four different fertiliser schedules for young rubber. In some cases this desire for completeness has led to unnecessary duplication; for instance old and new methods for legume seed treatment and for leaf sampling in cases of nutritional disorder are quoted, when the position would have been adequately covered in each case by mention of the more recent method only. Weed control is discussed in good detail although some potentially important herbicides which have appeared since the book was written are not mentioned.

Botanical. There are detailed sections on planting material, planting methods, ground covers, tapping systems and latex collection.

The history of breeding work in Malaya and its results in the shape of clones recommended for planting should help the planter to appreciate the difficulties and the long period of time involved in the selection of improved planting material.

Information on recommended planting material is not entirely up to date even though more recent recommendations are given in addenda.

A recent development which is not mentioned is the new technique of rooting cuttings of clones.

Among planting methods, hedge planting is discussed in detail, but in our view the disadvantages of hedge planting, already made clear in our experimental work, are not sufficiently emphasised.

On page 325, in the section on tapping, it is recommended that the change-over of panels on seedling trees should not be simultaneous. This is at variance with our recommendations for simultaneous change-over on all types of trees. The view now held at the Institute is that simultaneous change-over of tapping panels on all trees will greatly facilitate planning of tapping policy and sudden deviations from a fixed schedule. Uniformity in the field is a strict requirement for the proper execution of a programme in which stimulation and a double-cut tapping system are combined.

In the same section, page 337, attention is rightly drawn to the fact that the largest element in the cost of production of rubber is the cost of tapping and collection. The author stresses the need for focussing attention on the efficiency of these operations and on the economic return per unit of labour.

With regard to yield stimulation and associated tapping, the book is not entirely up to date. For information on this subject, planters should refer to articles on yield stimulation in *Planters' Bulletin 45* and in this issue.

Pathological. A comprehensive survey of the diseases and pests of *Hevea* and their control is given in the section Pests and Diseases, and this book is the only up-to-date publication where such information can be found under one cover. Two of the topics dealt with are not discussed elsewhere in any other post-war publication: treatment of root disease in old rubber, and details of dusting procedure.

Useful additional points that might have been made are: (page 241) that *Poria* has been found where doubletons have been thinned out by cutting, and that pink disease in the upper part of the canopy normally starts on a straight branch but grows back to a fork; several reported *Dothidella*-resistant (DR) clones other than FX 25 (page 255) have been established as budwood (the clonal seedlings mentioned are actually hand-pollinated crosses with high-yielding Malayan material); *Phytophthora* pod-rot (page 259) is very rare, as no reports have come in since the war; lead arsenate scorches not only *Calopogonium* but also *Pueraria* (page 270); Chrysomelid beetles (page 272) have been found only on cover crops, not on rubber.

Points that have emerged since the book went to the printer are the usefulness of a wood preservative applied to the cut surfaces of stumps (page 238), the discontinuation of the secondary leaf-fall circular (page 250), and the effectiveness of 1 in 600 Dieldrex 15 for control of white ants, in place of 1 in 300 (page 266).

Misprints are very few indeed, but the following are worth mentioning: (page 265 fifth paragraph) 'infected' should be 'infested'; (page 267, 268) *Psilolophis,* should be *Psilopholis;* (page 269) Agrocide 2 should be Agrocide 3, and Gammalin should be Gammalin 20. It is advantageous to spell endrin, aldrin, and chlordane with a lower-case initial letter to distinguish them from the commercial product Endrex etc. This distinction would help the reader on page 266, where it is not fully clear that it is the proprietary material that is to be diluted. It might be inferred from the statement on page 266 that chlordane was suitable at 1: 700 on peat and clay; in fact it is not recommended on these soils.

Chemical. The 1960 edition has been revised and expanded to include recent modifications to processing methods and even details of preparations of new types of rubbers which are now in commercial production. Changes have been made in recommendations where necessary, an example being the increase in thickness to $\frac{3}{8}$ in. in the smokehouse furnace face plate (page 392). Unfortunately in this case the alteration was not also made on the plan on page 393.

Very useful information is given on tests and specifications of the various grades of rubber, together with recommended methods of packing and marking for shipment.

Sections 12 and 13 are especially recommended for study by junior planters and assistants who are new to the industry.

Illustrations of Pests and Pest Damage

Our Pathological Division urgently needs further specimens of pests and fresh pest damage, for making water-colour paintings to complete the illustrations for a companion volume to *Maladies of Hevea.* We would therefore be most grateful to be informed of the occurrence of outbreaks of the following:

Cockchafer grubs (the species required is *Psilopholis vestita*)

Leaf-eating caterpillars, weevils and grasshoppers

Scale insects: from samples of these we hope to find certain predatory caterpillars and parasitic fungi; we are also interested in severe cases of scale insect attack on leaves and shoots

Ants harbouring mealy bugs on the tapping panel

Crickets and cricket damage

Snail damage (specimens of *Amphidromus* are required

Damage by mammals, particularly by flying-fox, porcupine and deer

Dieback of young seedlings of *Calopogonium* or *Centrosema,* which may be attacked by maggots in the region of the collar.

Appointment of Director R.R.I.M.

Dr C.C. Webster, at present Professor of Agriculture and Acting Principal at the Imperial College of Tropical Agriculture, Trinidad, has been appointed Director of the Rubber Research Institute of Malaya. It is expected that he will take up his new appointment in mid-January 1961.

Dr Webster obtained his B.Sc. and Diploma in Agriculture at Wye College where he completed his studies in 1931. He spent the following two years at Selwyn College, Cambridge and at the Imperial College of Tropical Agriculture, of which he is an Associate.

Dr Webster began his career as a Research Botanist at the Tung Oil Estates Ltd at Hsumthai, Burma in 1933 where he remained until he joined the Colonial Agricultural Service in 1936. He worked with distinction in this Service from then until 1957, serving in Nigeria, Nyasaland, Kenya and finally in Malaya where he was Deputy Director of Agriculture in 1956-7.

During his service in Africa, Dr Webster maintained his interest in tung oil trees and many of his contributions to scientific journals are on the cultivation and improvement of this crop. Dr Webster's thesis for his Ph.D degree at London University in 1949 was on 'The Improvement of Yield in the Tung Oil Tree'.

In 1957, Dr Webster was appointed Professor of Agriculture and Director of Studies at the Imperial College of Tropical Agriculture, where he will remain until he takes up his new appointment at the R.R.I.M.

Readers will join the staff of the Institute in welcoming Dr Webster and his family to Malaya and wishing him every success in his new post.

The Staff of the Estates Advisory Service

Mr F. W. Hutchison, N. D. A., C.D.A., has been appointed Head of the Estates Advisory Service on the retirement of Mr L.R. Davidson in October. Mr Hutchison joined the Pathological Division of the R.R.I.M. in March 1948, after experience in the National Agricultural Advisory Service in England.

Recent increases in staff have allowed the Estates Advisory Service to extend its operations to cover the full field intended. Since the beginning of July the Service has handled all routine botanical and pathological advisory problems in addition to those relating to soils and manuring. The Institute's policy of endeavouring to increase the use made of our services by the smaller proprietary estates has also borne fruit and there has been a marked increase in the work brought to us by owners of small estates.

The staff now available to assist Mr Hutchison to meet demands for advice in the agronomic field are:

Mr J. H. Chapman, B. Sc. (Agric.) whose transfer from the Experiment Station in February 1960, was noted in *Planters' Bulletin 48*.

Mr Lim Poh Loh, holder of the Diploma of the College of Agriculture, Serdang, and former Rubber Instructor, who returned to the service of the Institute in the Estates Advisory Service in April 1959, after more than three years experience in commercial rubber planting.

Mr N. S. Bharathi, B.Sc. (Agric.), (Madras), who held appointments in the Department of Agriculture in the Federation of Malaya and Brunei, before joining the Service in July 1960.

Mr Lim Bock Tong, B.Sc. (Western Australia), who has had three years experience of field research with a commercial rubber organisation and joined the Service in October.

Retirement of Mr L. R. Davidson

At the beginning of October we said goodbye to one more of the few remaining pre-war members of staff, Mr Llewellyn Robert Davidson, the Head of the Estates Advisory Service, who joined the staff of the Soils Division of the Institute in December 1940, having first come to Malaya in 1936 to take up a planting appointment on Carey Island.

Mr Davidson received his agricultural training at Harper Adams Agricultural College, Shropshire and at Edinburgh University, where he took a B.Sc. in Agriculture in 1936.

He joined the Soils Division as a field experiments and advisory officer but soon after returning to duty, following the war period, he was put in charge of the Smallholders' Advisory Service.

Mr Davidson was very successful in building up this Service to smallholders during the post-war period when there were considerable staffing difficulties and in 1958 he handed over to his successor a vigorous organisation. He himself then assumed responsibility for initiating the Estates Advisory Service, of which he became the first Head, and during his relatively short term of office he has again shown his skill for organising advisory work by establishing the new Service on a thoroughly sound basis.

Mr Davidson is leaving Malaya well before normal retiring age in order to take up farming in the United Kingdom.

Mr Davidson has always been popular with his staff and his colleagues and this has been no small factor contributing to his very successful career with the Institute. Before the war he was a keen Volunteer and he has also had a long interest in cross-country running which he has maintained until his retirement.

Both he and his wife, who is well known for her work as a medical officer, will be greatly missed by their many friends and we wish them every success and happiness for the future.

R. R. I. News

Mr B.C. Sekhar of the Chemical Division attended the International Symposium on Macromolecular Chemistry in Moscow during June, when he read a paper on 'The Physico-chemical Changes of the Rubber Hydrocarbon in *Hevea* Latex on Storage'. The Conference was organised by the International Union of Pure and Applied Chemistry. Mr Sekhar also visited laboratories in Great Britain and synthetic rubber plants in Holland and Italy.

Obituary

Mr K.N. Kaimal joined the Rubber Research Institute of Malaya in 1927 when he was 27 years old, after graduating from H.H. The Maharaja's College of Science in Travancore. He remained at the Institute until 1950, when he resigned to become Rubber Production Commissioner of the Indian Rubber Board and Director of the Rubber Research Institute of India. Mr Kaimal's impressive authority and insight proved of immense value to the Indian Rubber Board. His untimely death has robbed his country of a good servant, and the Rubber Research Institute of India of an excellent Director. His colleagues in Malaya send their condolences to his family and friends in India.

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